



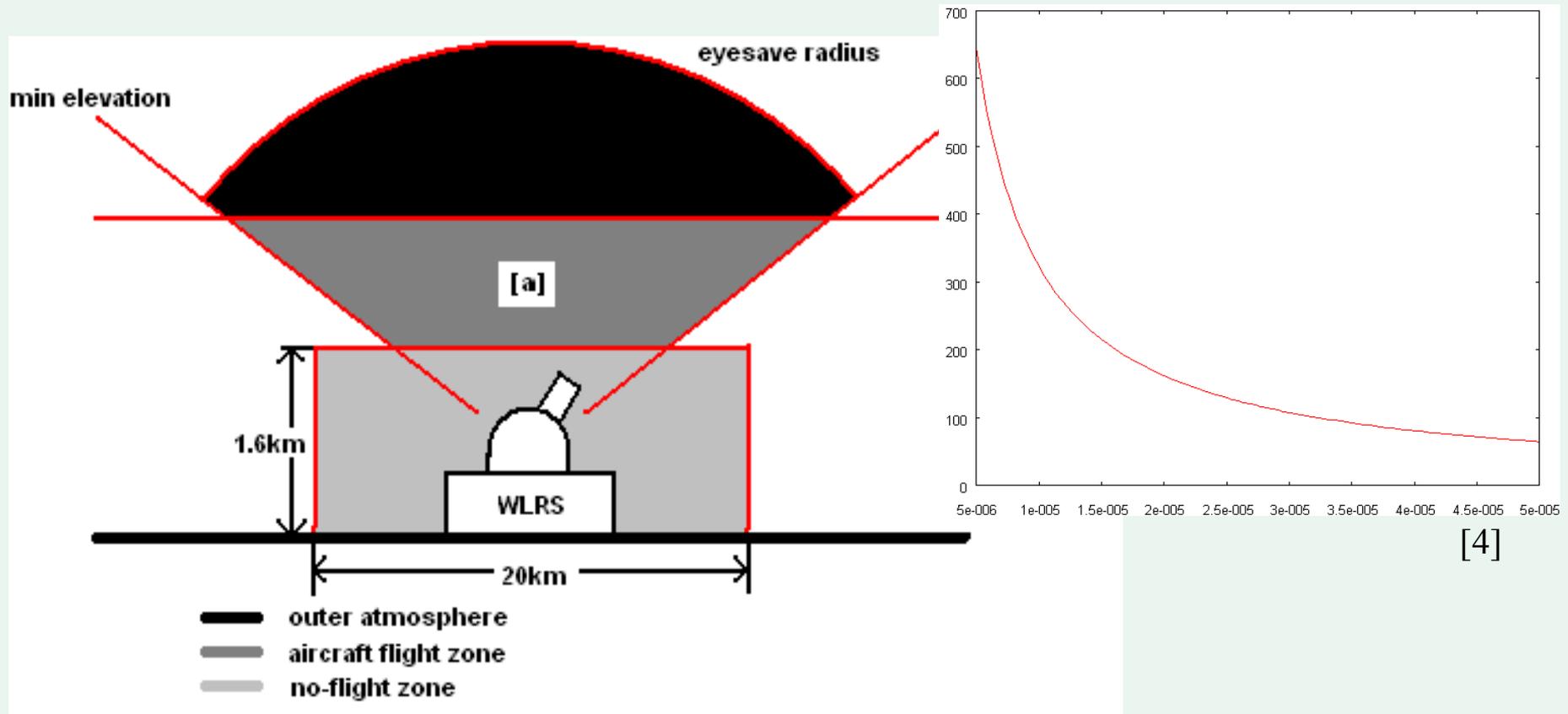
WLRS: In-Sky-Laser-Safety

J. Eckl, M. Ettl et al.

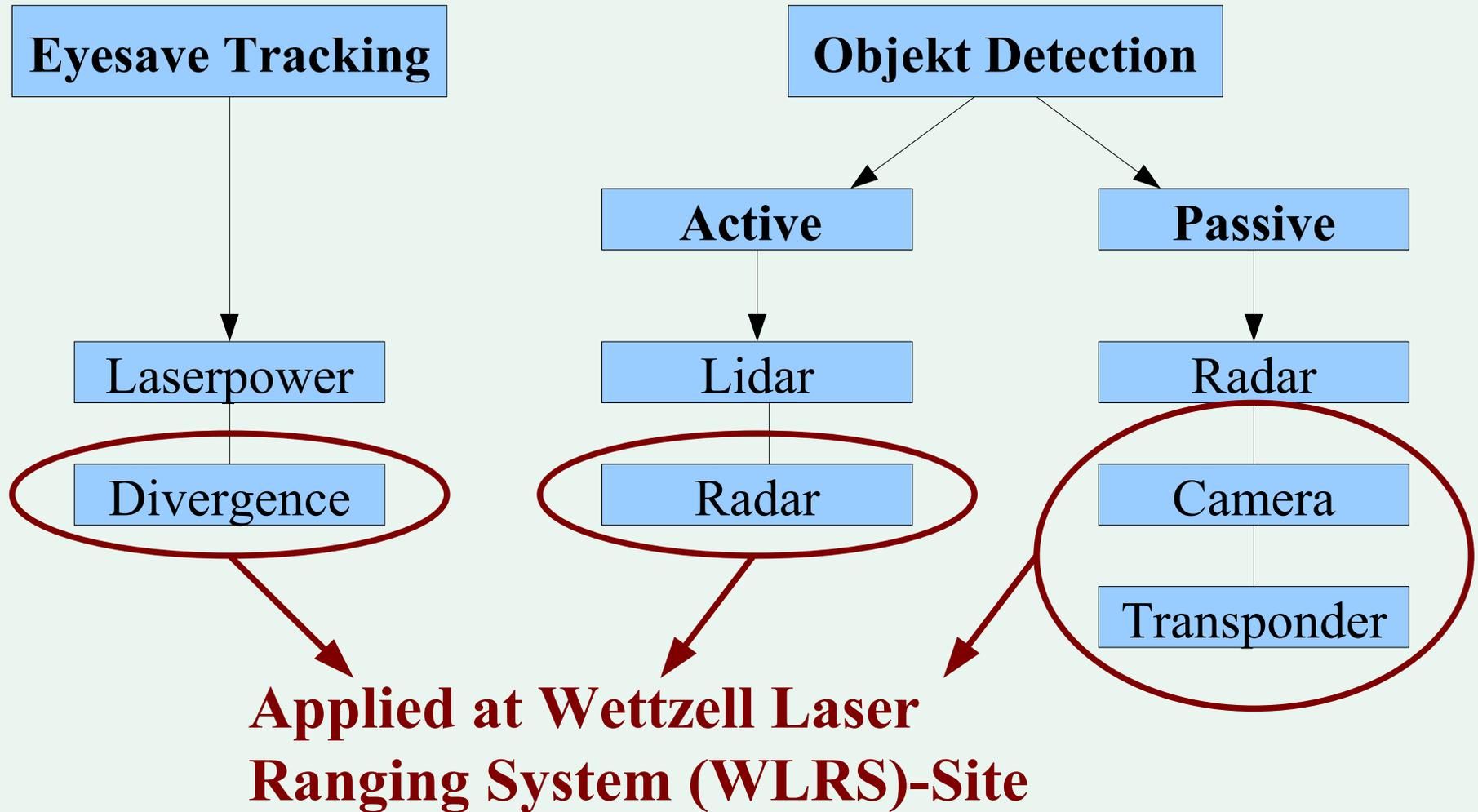
Geodetic Observatory Wettzell



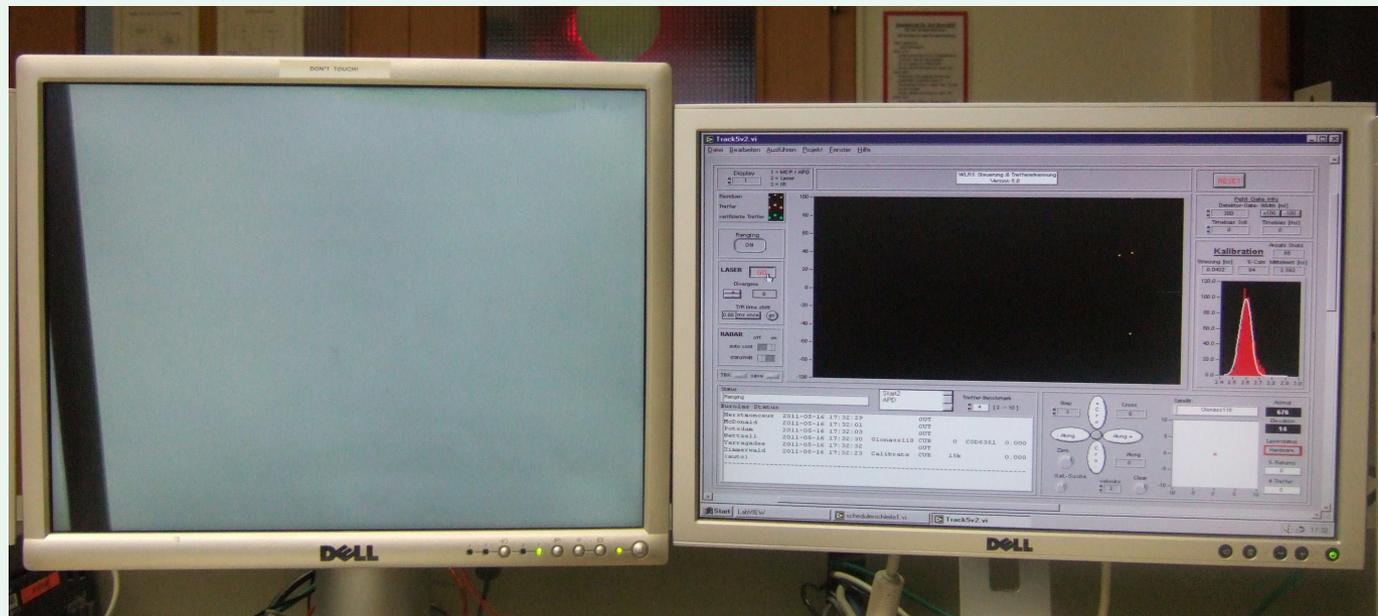
1. Neccessity and strategies
2. Current WLRS In-Sky-Savety equipment
3. Transponder
4. Conclusion



=> area [a] (1.6→40km) most critical



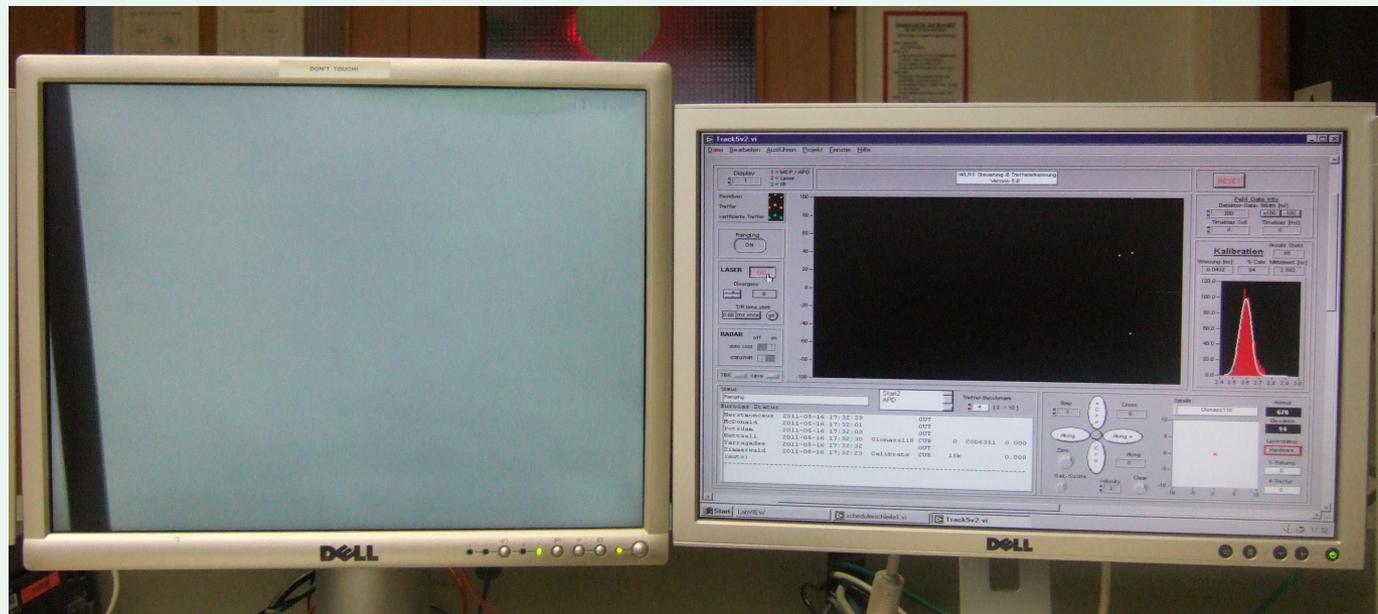
- Sky-camera mounted on telescope tubus
- Permanent monitoring through observer



but:

- Dependent on observers interpretation and constitution (night-shift, ...)

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- Honeywell Laser Hazard Reduction System (LHRS) as primary WLRS in-sky-safety device
 - Officially approved system
 - Covers hole range [a] (0.4-40 kilometers)
- but:
- Clutter problems
 - High acquisition costs



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- **Not VLBI 2010 conform !!!**

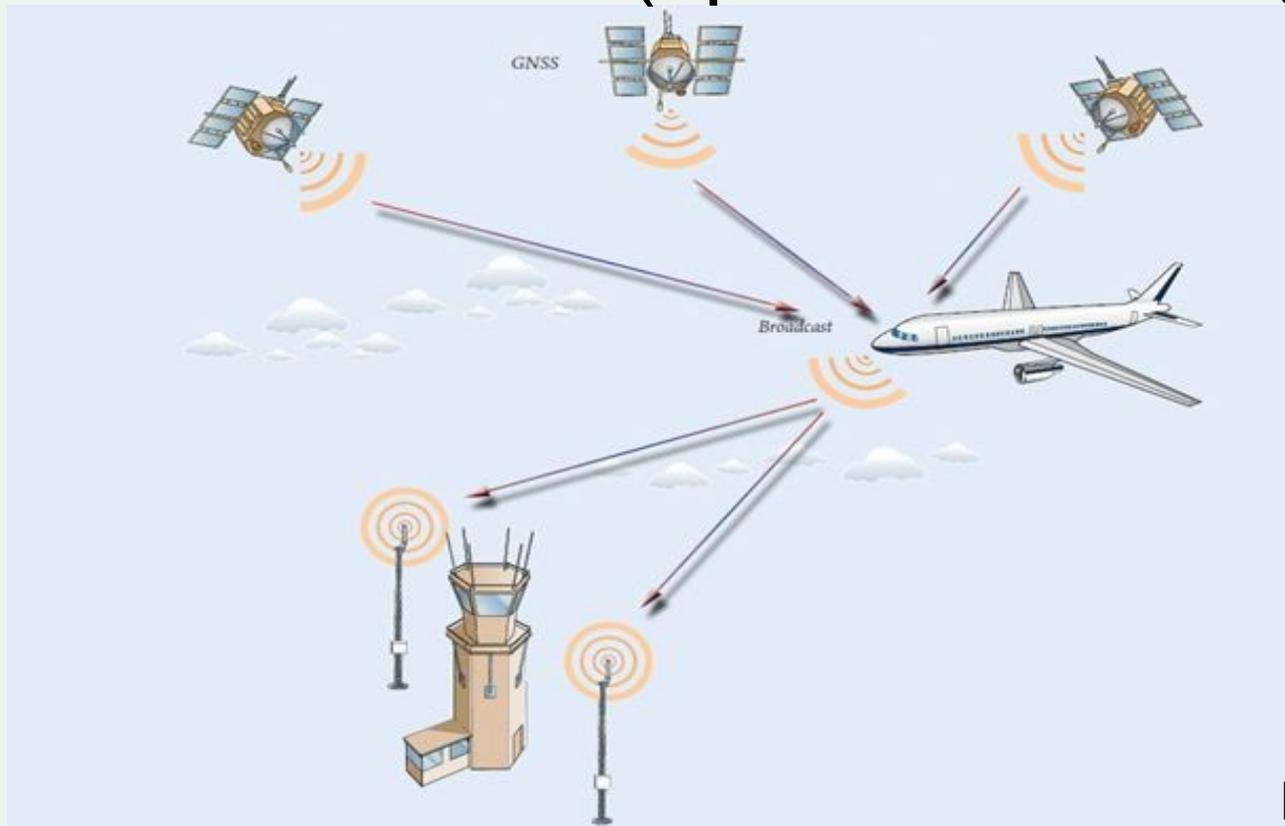


Automatic
Dependent
Surveillance -
Broadcast

is a European Aviation Safety Agency (EASA) approved sole working aviation surveillance system.

Global implementation for Europe in 2015 [1]

ADS-B: Continuously broadcast GNSS derived position through aircraft undirected (up to 370km range)



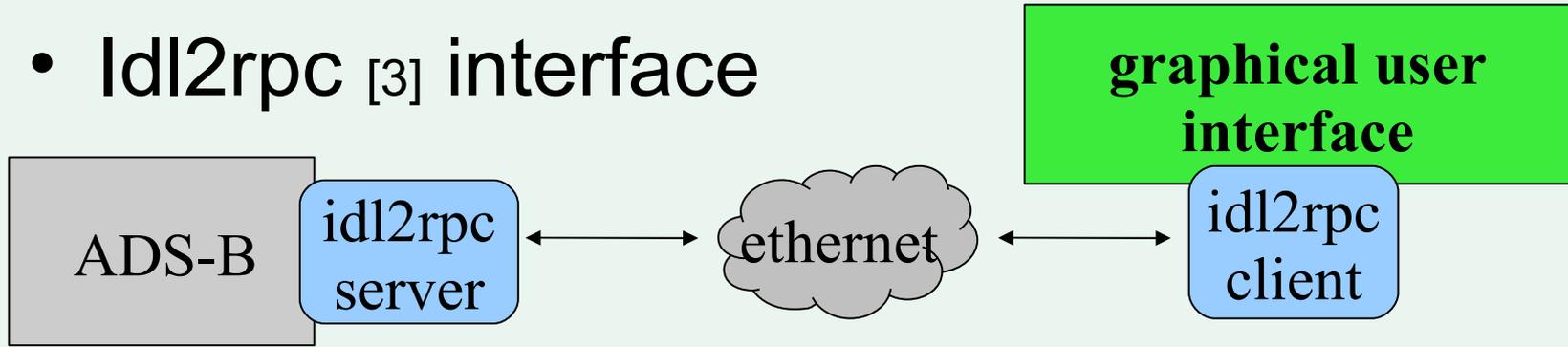
[2]

Installation of:

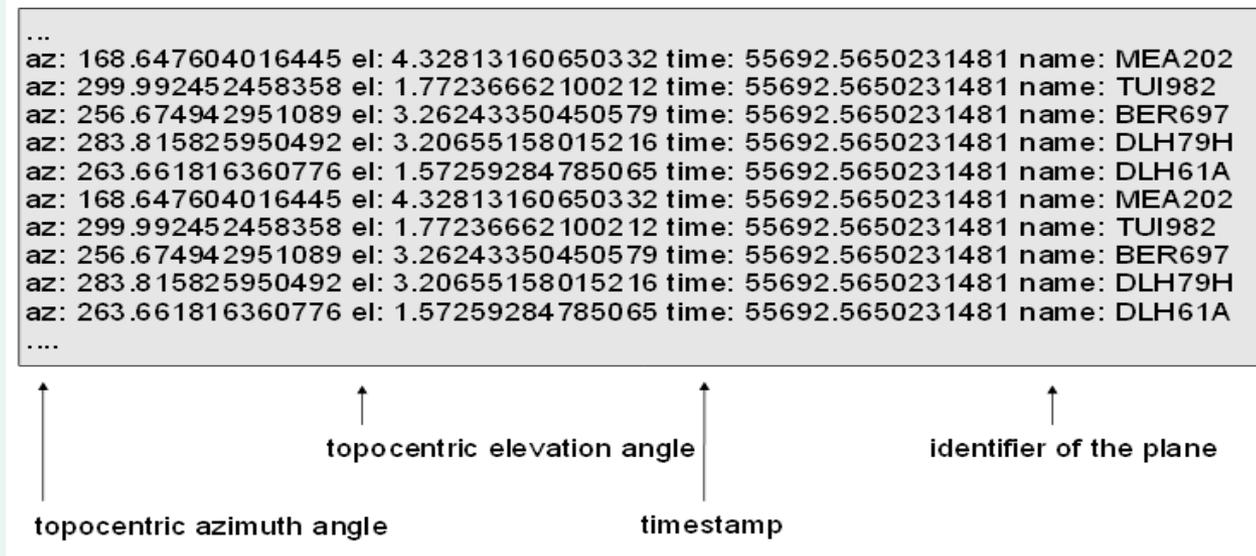
- AirNav® RadarBox PRO (500,- €)
- Antenna and amplifier (200,- €)
- Computer MS Windows based
- USB interface

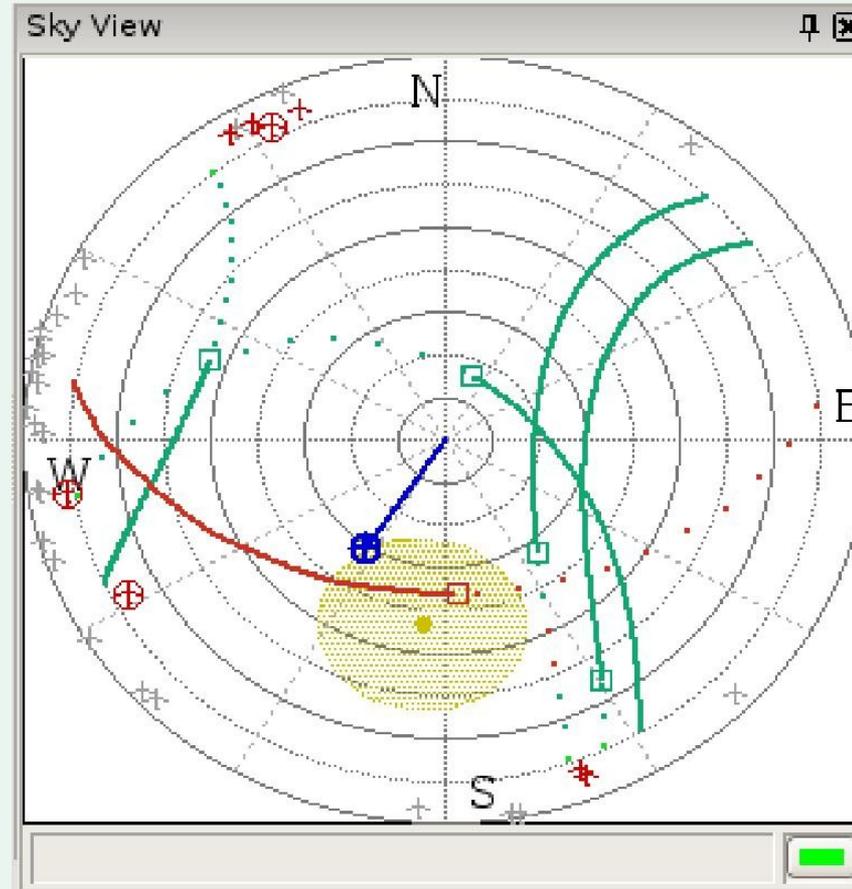


- Idl2rpc [3] interface



- Provided datastream





- Verification of aircraft coordinates
- Include avoidance zones for each aircraft

- **ADS-B can not yet replace active radar**
 - ↳ still no legally binding for usage in aircraft
 - ↳ currently often just used at places where:
 - heavy sky traffic appears
 - no active radar is present
- **Transponder as redundant system**
 - ↳ covers hole range [a]
 - ↳ low cost
 - ↳ simple installation
 - ↳ network extension planned

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 - ↳ network extension planned
- all in all: still no satisfying solution meeting fundamental station requirements

- [1] Roland Weibel, Marisa Jenkins, R. John Hansman: Automatic Dependent Surveillance-Broadcast (ADS-B) Costs, Benefits, Applications, and Implementation Challenges, Airline Advisory Board Meeting, November 6, 2008
- [2] Air Navigation and Weather Service (ANWS), Taipei.
- [3] Neidhardt, A.: Manual for the remote procedure call generator “idl2rpc.pl”, Geodetic Observatory Wettzell, 2009.
- [4] Schreiber, Ulrich: ELT Laser Safety Assessment